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<p>(21) International Application Number: PCT/US98/21912</p> <p>(22) International Filing Date: 16 October 1998 (16.10.98)</p> <p>(30) Priority Data: 08/954,244 20 October 1997 (20.10.97) US 09/090,590 22 May 1998 (22.05.98) US</p> <p>(63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Applications US 08/954,244 (CON) Filed on 20 October 1997 (20.10.97) US 09/090,590 (CON) Filed on 22 May 1998 (22.05.98)</p> <p>(71) Applicant (for all designated States except US): GENERAL MILLS, INC. [US/US]; Number One General Mills Boulevard, P.O. Box 1113, Minneapolis, MN 55440 (US).</p> <p>(72) Inventors; and</p> <p>(75) Inventors/Applicants (for US only): HUNT, Marsha, Doris, Thompson [US/US]; 4150 Colfax Avenue South, Minneapolis, MN 55409 (US). MONFORTON, Randal, J. [US/US]; 8901 Belvedere Drive, Eden Prairie, MN 55347 (US). LAN-</p> <p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</p>			
<p>(54) Title: EASILY EXPANDABLE, NONTRAPPING, FLEXIBLE PAPER, MICROWAVE PACKAGE</p>			
<p>(57) Abstract</p> <p>A flexible paper popcorn package in the form of an easily expandable, nontrapping bag (18) is disclosed including a bottom wall (20) and a top wall (22) interconnected together adjacent their circular outer peripheries (20a, 22a) by first and second interconnection portions (26a, 26b). In one preferred form, the top wall (22) is formed by first and second wall portions (22b, 22c) interconnected together by a peelable closure seal (28). In another preferred form, the top wall (22) is formed from a first portion (22d) having an access opening closed by a closure portion (22e) interconnected by a seal (40) including the peelable closure seal portion (40a) to the first portion (22d). In still another preferred form, the bottom and top walls (20, 22) are interconnected together by their interconnection to gusseted side panels (50, 52), with the peelable closure seal being formed in the interconnection between the bottom and top walls (20, 22). The bottom and top walls (20, 22) expand into an opposing double domed shape as the popcorn kernels are being popped in the microwave oven. This domed shape of the bottom wall (22) keeps the unpopped popcorn huddled closer together and enhances the bag (18) to rock to maximize gravimetric separation. The bag (18) provides a serving bowl function when the peelable closure seal has been opened providing access to the interior of the bag (18) and specifically to the popped popcorn located therein.</p>			

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1        EASILY EXPANDABLE, NONTRAPPING, FLEXIBLE PAPER,  
MICROWAVE PACKAGE

BACKGROUND

5        The present invention relates generally to packages  
for use in microwave ovens, pertains particularly to an  
easily expandable, nontrapping, flexible, microwave  
package formed of non-extendable material for the popping  
or puffing of grains and especially popcorn kernels, and  
pertains more particularly to a microwave package  
10      providing serving bowl and/or easy open features.

15      To conserve space during shipping and storage,  
microwave popcorn packages are often folded flat. During  
popping by use of microwave energy, the popcorn package  
expands, with the expansion due to the internal pressure  
of the steam produced by the popping of the popcorn  
kernels, the pressure of the popped kernels themselves, as  
well as other factors. An important feature for  
maximizing the volume of the popped kernels is the ability  
of the microwave popcorn package to easily expand.  
20      Another important factor for maximizing the volume of the  
popped kernels is that the number of kernels which are  
actually popped be maximized by insuring that the unpopped  
kernels are located together on the susceptor with  
sufficient dwell time to receive sufficient heat energy to  
25      result in popping. The shape of the bag plays an important  
role in the ability of the bag to expand as well as the  
ability of unpopped kernels to come in contact with each  
other and the susceptor before and during popping.

30      One form of conventional popcorn packages is a bag  
having a rectangular top, a rectangular bottom and pleated  
sides and with at least one end being sealed together by  
attaching the top and bottom together such as but not  
limited to by folding the end of the bag over onto itself.  
It is a common problem for unpopped kernels to be  
35      propelled in the popping process into folds and crevices  
in the bag and especially those created by the pleats in  
the sides adjacent to the end(s) of the bag. Such kernels

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1 may tend to be captured in such folds and crevices so that  
they are unable to travel towards the susceptor and are  
less likely to be popped during microwave cooking.

Further, conventional rectangular popcorn bags tend to  
5 get hung up in the corners of the microwave ovens. This  
is undesirable for microwave ovens including turntables as  
the bag will no longer rotate inside of the microwave  
cavity but is locked in position by the corner. However,  
even for microwave ovens which are not equipped with  
10 turntables, the expansion of the bag and/or the vibration  
of the bag caused by the popping of the popcorn does not  
result in moving the bag to the center of the microwave  
cavity when the bag gets hung up in a corner of the  
microwave cavity. This is undesirable as cooler spots  
15 typically exist in the corners of the microwave cavity and  
as lack of movement of the bag subjects certain points in  
the bag to see specific hot spots or electronic nulls.

Thus, a need continues to exist for an improved  
flexible paper popcorn package which is easily expandable  
20 by the dynamics involved in popping the kernels, which is  
less likely to capture unpopped kernels during the  
expansion of the package while subjected to microwave  
energy, and which provides the most consistent and uniform  
distribution of microwave energy in maximizing the number  
25 and volume of popped popcorn. In further aspects of the  
present invention, the popcorn package which is utilized  
to pop the popcorn kernels has the ability to be utilized  
as the serving bowl during consumption of the popped  
kernels. In still other aspects of the present invention,  
30 the expanded popcorn package can be easily opened by the  
consumer with minimal instructions.

Surprisingly, the above need and other objectives  
can be satisfied by providing, in the preferred form,  
an expandable microwave package in the form of a bag  
35 formed by top and bottom walls of flexible, non-extendable  
material interconnected together adjacent to their

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1 round-like shaped outer peripheries so that the top and  
bottom walls expand into an opposing double domed shape  
when the popcorn kernels are popped in the microwave oven.

5 In a most preferred form, the top wall includes a  
peelable closure seal which vents during microwave cooking  
and which can be physically separated after microwave  
cooking for ease of access to the popped popcorn and so  
that the bag clearly functions as a serving bowl. In most  
10 preferred aspects, the peelable closure seal is formed in  
the interconnection between first and second wall  
portions, and in a preferred form the bag further includes  
first and second extensions extending outwardly from the  
first and second wall portions for grasping to separate  
the first and second wall portions.

15 In another most preferred form, the top wall is  
fabricated from multiple layers and includes a first  
annular portion having an access opening and a closure  
portion of a size greater than the access opening and  
interconnected to the first portion by a seal. In most  
20 preferred aspects, the seal includes a peelable closure  
portion which fails during microwave cooking, and an  
extension is formed on the outer periphery of the closure  
portion for grasping when removing the closure portion.

25 In still another preferred form, the peelable closure  
seal is formed in the interconnection between the bottom  
and top walls. In most preferred aspects, extensions are  
formed on the outer peripheries of the top and bottom  
walls adjacent the peelable closure seal and outward of  
the interconnection, with the consumer grasping and  
30 pulling the extensions to open the bag for removing the  
popped popcorn from the interior of the bag.

35 In other preferred aspects of the present invention,  
the bottom and top walls are interconnected together by  
their interconnection to first and second gussetted side  
panels, with the outer periphery of the bottom wall being  
interconnected to the outer peripheries of the first panel  
portions of the first and second gussetted side panels and

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- 1 the outer periphery of the top wall being interconnected to the outer peripheries of the second panel portions of the first and second gussetted side panels, with the outer peripheries of the panel portions corresponding to the
- 5 outer peripheries of the bottom and top walls.

In still other preferred aspects of the present invention, the bag formed by the interconnection of top and bottom walls having round-like shaped outer peripheries is folded about first and second, parallel, fold lines located on opposite sides of a periphery interconnection portion, then folded about a third fold line extending perpendicularly between the first and second fold lines at which time the popcorn kernels are introduced through the periphery interconnection portion which is then sealed, and then folded about a fourth fold line extending parallel to the third fold line, with the folded bag having a conventional, rectangular shape for secondary packaging.

The present invention will become clearer in light of the following detailed description of illustrative embodiments of this invention described in connection with the drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The illustrative embodiments may best be described by reference to the accompanying drawings where:

Figure 1 shows a perspective view of a package fabricated in accordance with the preferred teachings of the present invention in generally an expanded condition.

Figure 2 shows a top plan view of the package of Figure 1 in an unfilled, flat condition, with portions broken away.

Figure 3 shows a perspective view of the package of Figure 1 in an unfilled, partially folded condition, with portions broken away.

Figure 4 shows a perspective view of the package of Figure 1 in an unfilled, partially folded condition.

Figure 5 shows a perspective view of the package of

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1   Figure 1 in an unfilled, partially folded condition and with the peripheries in the upper edge separated for the introduction of popcorn kernels and the like, with portions broken away.

5   Figure 6 shows a top plan view of the package of Figure 1 in a filled, partially folded condition, with portions broken away.

Figure 7 shows a perspective view of the package of Figure 1 in a filled, folded or collapsed condition.

10   Figure 8 shows a cross sectional view of the package of Figure 1 according to section line 8-8 of Figure 1, with the popped popcorn being removed for ease of illustration.

Figure 9 shows a side view of the package of Figure 1 in an opened condition.

Figure 10 shows a top plan view of a package in an unfilled, flat condition and fabricated in accordance with the preferred teachings of the present invention, with portions broken away.

20   Figure 11 shows a perspective view of the package of Figure 10 in a filled, expanded, and partially opened condition.

Figure 12 shows a perspective view of a package fabricated in accordance with the preferred teachings of the present invention and in an expanded condition showing a preferred method of opening.

Figure 13 shows a top plan view of a package in an unfilled, flat condition and fabricated in accordance with the preferred teachings of the present invention, with portions broken away.

Figure 14 shows a diagrammatic, perspective view of the package of Figure 13 in an expanded condition showing a preferred method of opening.

35   Figure 15 shows a diagrammatic, perspective view of the package of Figure 13 in an expanded condition to illustrate its enhanced serving bowl function.

Figure 16 shows an exploded perspective view of the

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1 package of Figure 13 diagrammatically illustrating one  
method of fabrication according to the teachings of the  
present invention.

5 Figure 17 shows a top plan view of a package in an  
unfilled, flat condition and fabricated in accordance with  
the preferred teachings of the present invention, with  
portions broken away.

All figures are drawn for ease of explanation of the  
basic teachings of the present invention only; the  
10 extensions of the Figures with respect to number, position,  
relationship, and dimensions of the parts to form the  
preferred embodiments will be explained or will be within  
the skill of the art after the following teachings of the  
present invention have been read and understood. Further,  
15 the exact dimensions and dimensional proportions to  
conform to specific force, weight, strength, and similar  
requirements will likewise be within the skill of the art  
after the following teachings of the present invention  
have been read and understood.

20 Where used in the various figures of the drawings,  
the same numerals designate the same or similar parts.  
Furthermore, when the terms "top", "bottom", "first",  
"second", "side", "end", "inner", "outer", "inside",  
"outside", and similar terms are used herein, it should  
25 be understood that these terms have reference only to the  
structure shown in the drawings as it would appear to a  
person viewing the drawings and are utilized only to  
facilitate describing the preferred embodiments.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

30 A package for use in microwave ovens according to the  
preferred teachings of the present invention is shown as  
an expandable, flexible bag in the drawings and generally  
designated 18. It will facilitate the ensuing description  
to consider bag 18 in the horizontal position when placed  
35 in the microwave oven. Therefore, bag 18 includes a  
bottom wall 20 and a top wall 22 of a shape and size  
generally corresponding to bottom wall 20. Each wall 20

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1 and 22 is formed by a sheet of flexible but non-extendable  
material such as papers including but not limited to base  
coated paper or similar cellose structures, polymers  
including but not limited to polyethylene terephthalate,  
5 polyester and nylon, or other like microwaveable  
materials. The material forming walls 20 and 22 can be  
opaque, translucent, clear, or combinations thereof. Each  
wall 20 and 22 includes an outer periphery 20a and 22a,  
respectively, which is generally equidistant from the  
10 center 24 of the shape of walls 20 and 22 and in the most  
preferred form is generally circular in shape. However,  
peripheries 20a and 22a could be in other substantially  
round or round-like shapes which are arcuate and/or  
include peripheral edge interconnections which do not have  
15 a tendency of getting hung up in the corners of the  
microwave oven such as symmetrical shapes including ovals,  
pentagons, hexagons, heptagons, octagons, etc. and such as  
non-symmetrical shapes such as a generally egg shape.

To define a hollow interior, walls 20 and 22 are  
20 interconnected together adjacent to peripheries 20a and  
22a by a seal which maintains the integrity of bag 18  
during manufacture, handling, transportation and retailing  
of bag 18 and its contents and until microwave cooking.  
In the most preferred form, the interconnection between  
25 walls 20 and 22 is sufficient so as to seal adequately the  
vapor created within the bag 18 during the heating thereof  
in the microwave oven as well as to prevent undesired  
opening during the consumption of the popped kernels. In  
the most preferred form, a suitable annular adhesive strip  
30 26 is added to the inside surface of one or both of walls  
20 and 22 to secure walls 20 and 22 together adjacent  
peripheries 20a and 22a after the application of heat  
and/or pressure. Additionally, when interconnected by  
adhesive strip 26, walls 20 and 22 can be positioned so  
35 that they are generally planar and continuously abut  
without bulges or folds in the most preferred form.

In the most preferred form, bag 18 includes a

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1 susceptor patch 30 that extends over a portion of bottom  
wall 20 spaced from periphery 20a and in the most  
preferred form generally centered about center 24.  
Susceptor patch 30 can be formed in any suitable manner  
5 known in the art such as a metalized plastic film adhered  
to bottom wall 20 as diagrammatically shown in Figure 8  
(with the thickness of susceptor patch 30 being  
exaggerated for ease of illustration) or adhered between  
separate layers forming bottom wall 20, as a paper backed  
10 susceptor, or as a coating applied or printed to bottom  
wall 20. Further, although susceptor patch 30 is shown as  
overlying bottom wall 20 and thus located inside of bag  
18, susceptor patch 30 can be located outside of bag 18  
with bottom wall 20 overlying susceptor patch 30.  
15 Further, placement of susceptor patch 30 can occur at the  
material converter or on the manufacturing lines.

In the preferred form shown in Figures 1, 2, 8 and 9,  
top wall 22 is formed from first and second wall portions  
22b and 22c which are interconnected together by a fin  
20 seal 28. In the preferred form, portions 22b and 22c are  
generally semicircular in shape and fin seal 28 extends  
between opposite points on periphery 22a and specifically  
along a diameter of the circular shape of periphery 22a.  
Fin seal 28 provides a peelable closure which partially fails  
25 during microwave cooking. Specifically, this partial  
failure of fin seal 28 allows trapped steam to vent from  
bag 18 as well as allows the consumer to continue to peel  
seal 28 to open bag 18 after microwave cooking to provide  
access to the popped popcorn kernels in the hollow  
30 interior of bag 18 for consumption.

Bag 18 can be manufactured according to the preferred  
teachings of the present invention in the following  
manner. Specifically, walls 20 and 22 are positioned with  
their inside surfaces abutting together and with  
35 peripheries 20a and 22a aligned. A first, interconnection  
portion 26a of strip 26 is suitably activated to  
interconnect walls 20 and 22 together aside from a second,

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1 interconnection portion 26b. While first, interconnection portion 26a extends a substantial portion of peripheries 20a and 22a, second, interconnection portion 26b in the preferred form has a radial extent generally equal to one 5 half of the diameter of the shape of peripheries 20a and 22a.

At that time, the partially formed bag 18 can be folded along parallel fold lines 32a and 32b which are radially spaced generally equal to one half of the 10 diameter of the shape of peripheries 20a and 22a and extending from first and second points on opposite sides of and generally coextensive with the ends of portion 26b. In the preferred form, fold lines 32a and 32b are located on opposite sides of the diameter of the shape of 15 peripheries 20a and 22a and equidistant therefrom. Thus, bag 18 is divided into a central portion 34a and first and second wings 34b and 34c which are folded to overlay central portion 34a. Wings 34b and 34c have a radial width generally equal to one fourth of the diameter of the 20 shape of peripheries 20a and 22a and generally equal to one half of the radial width of central portion 34a. Thus, wings 34b and 34c do not overlay each other when folded to overlay central portion 34a. Bag 18 as folded at this point includes first and second, parallel, 25 straight side edges defined by fold lines 32a and 32b and upper and lower edges which are generally convex defined by peripheries 20a and 22a intermediate fold lines 32a and 32b.

The partially formed bag 18 can then be folded about a 30 third fold line 36 extending generally perpendicularly between the first and second straight side edges defined by fold lines 32a and 32b and located about one third of the diameter of the shape of peripheries 20a and 22a from the lower edge. Thus, bag 18 includes a wing 36a which 35 includes the lower parts of portion 34a and wings 34b and 34c and which is folded to overlay wings 34b and 34c, with portion 26b being opposite to wing 36a. Bag 18 as folded

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- 1 at this point includes first and second, parallel, straight side edges defined by fold lines 32a and 32b, a straight lower edge defined by fold line 36 extending generally perpendicular to the side edges, and an upper
- 5 edge which is generally convex defined by peripheries 20a and 22a intermediate fold lines 32a and 32b and including portion 26b.

While in a folded condition and held with walls 20 and 22 being vertical with the upper edge located vertically above the lower edge, peripheries 20a and 22a in the upper edge are separated and a charge of popcorn kernels, fat or oil, salt, flavorings, or the like are introduced into the interior of bag 18. It should be appreciated that due to the folded condition of bag 18, the charge is generally prevented from passing beyond fold lines 32a, 32b and 36 and into wings 34b, 34c, and 36a but is retained adjacent center 24 of bag 18.

After the charge has been introduced, portion 26b can be suitably activated to interconnect walls 20 and 22 together. Thus, walls 20 and 22 are interconnected together around the entire length of peripheries 20a and 22a. Additionally, strip 26 and seal 28 close bag 18 so that the charge in the hollow interior of bag 18 is completely sealed from the environment.

25 After portion 26b is sealed, bag 18 can again be folded about a fourth fold line 38 extending generally perpendicularly between the first and second straight side edges defined by fold lines 32a and 32b and parallel to fold line 36 and located about one third of the diameter of the shape of peripheries 20a and 22a from the upper edge. Fold line 38 is located adjacent to peripheries 20a and 22a of wing 36a and is located above the charge in the hollow interior of bag 18. Thus, bag 18 includes a wing 38a which includes the upper parts of portion 34a and wings 34b and 34c and which is folded to overlay wing 36a. It should be appreciated that due to the folded condition of bag 18, the charge is also generally prevented from

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- 1 passing beyond fold line 38 and into wing 38a but is retained adjacent center 24 of bag 18. Bag 18 as folded at this point is generally rectangular shaped of a size and shape of conventional folded, paper popcorn bags and
- 5 includes first and second parallel side edges defined by fold lines 32a and 32b, and parallel lower and upper edges defined by fold lines 36 and 38, respectively. In the most preferred form, the folded, charged bag 18 is sealed into a flexible overwrap for packaging and storage.
- 10 Conventionally, such overwrap is formed by clear or opaque translucent plastic but could be formed by metalized film, sputtered glass/ceramic or other barrier constructions. It of course should be appreciated that typically such overwrap is removed by the consumer just prior to
- 15 microwave cooking.

For the sake of completeness, it will be assumed that the contents or charge of bag 18 are popcorn kernels or any suitable grain such as rice, maze, barley, sorghum, or the like for being popped or puffed when in the microwave oven. Particularly, as with current bags, bag 18 is placed in a microwave oven with bottom wall 20 resting upon the bottom surface of the oven cavity and preferably with bag 18 being partially or completely unfolded by the consumer. When subjected to microwave energy, susceptor patch 30 converts microwave energy into heat, with the heat and remaining microwave energy causing the popping of the kernels and the generation of water vapor/steam. The water vapor and heated vapor pressure air cause wings 38a, 36a, 34b and 34c to unfold or to continue to unfold about fold lines 38, 36, 32a and 32b, respectively, so that walls 20 and 22 have a continuous shape. Each wall 20 and 22 expand into a bowl, hemispheric or parabolic curve shape from their peripheries 20a and 22a with the inside surfaces of bottom and top walls 20 and 22 being spaced, expanding bag 18 and increasing the interior volume inside of bag 18 for the popped kernels. It can then be appreciated that due to its flexible nature, bag 18 will

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1 expand to an opposing, double dome shape. However, due to  
the non-extendable nature of the material forming walls 20  
and 22, the interconnection between walls 20 and 22  
adjacent to peripheries 20a and 22a will tend to gather  
5 and pucker as best seen in Figures 1, 8, and 9 as walls 20  
and 22 change their shape from being generally planar to  
being dome shaped. When bag 18 is formed of paper con-  
ventionally utilized for popcorn packages without further  
processing, the size, shape and direction of such puckers  
10 will generally not be uniform around peripheries 20a and  
22a and will tend to vary between different bags 18.

Bag 18 according to the preferred teachings of the  
present invention is advantageous over prior microwave  
popcorn bags. Particularly, when first placed in the  
15 microwave oven, the pleats of the sides of conventional  
popcorn packages extend at least partially over the charge  
of popcorn kernels to be popped. Thus, the initial  
microwave energy has to penetrate several layers of  
material which forms the bag. As the material is not  
20 completely transparent to microwave energy, part of the  
microwave energy is absorbed by the material which then is  
generally not available to the charge of popcorn kernels.  
However, only a single layer of material forming walls 20  
and 22 of bag 18 extends over the charge of popcorn  
25 kernels generally from the start of microwave cooking.  
Thus, it is not necessary for the initial microwave energy  
to penetrate several layers of material before reaching  
the charge and therefore the microwave energy is generally  
available quicker and in greater amounts to the charge.

30 Further, the bowl or parabolic curve shape of the  
inflated bag 18 keeps the unpopped kernels huddled closer  
together even in more than a single layer at the bottom of  
the shaped wall 20 and in closer contact with susceptor  
patch 30 in the preferred form. This close nesting or  
35 clustering of the unpopped kernels is a very efficient and  
attractive load for incoming microwaves. Specifically,  
the cluster load radiates less heat, and temperature

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1 increases at a quicker rate. The cluster load has a  
higher loss tangent (more lossy) than a dispersed load.  
Further, as the bowl or parabolic curve shape has a  
relatively low surface area to volume relationship similar  
5 to that of a sphere, walls 20 and 22 include less material  
which competes for microwave energy with the kernels.

Additionally, when the kernels pop, the popping  
kernels may spray unpopped kernels from the nesting.  
However, bag 18 according to the teachings of the present  
10 invention allows the unpopped kernels to settle to the  
bottom of the shaped wall 20 much like a covered Japanese  
Wok pan does. Further, the expansion of bag 18 according  
to the teachings of the present invention generally does  
not create folds or crevices which capture unpopped  
15 kernels and prevent their movement towards the cluster of  
any other unpopped kernels and/or susceptor patch 30.

Furthermore, the force of the popping kernels hitting  
against walls 20 and 22 jostles or vibrates bag 18 which  
enables the unpopped kernels to fall through the popped  
20 kernels and reengage wall 20 and to slide on wall 20 to  
the bottom thereof. Specifically, the vibration of bag 18  
creates agitation of the popped and unpopped kernels in  
bag 18 resulting in gravimetric separation of the unpopped  
kernels to the bottom of the popped kernels due to their  
25 greater density. In this regard, the bowl or parabolic  
curve shape of bottom wall 20 enhances the ability of bag  
18 to rock in any direction from the force of the popping  
kernels hitting against walls 20 and 22 to maximize the  
gravimetric separation of the unpopped kernels to the  
30 bottom of the popped kernels.

Still further, the bowl or parabolic curve shape of  
inflated bag 18 greatly improves popping performance in  
the diverse microwave ovens available to consumers. As  
much as a 40% improvement in popping performance was  
35 experienced with bag 18 according to the preferred  
teachings of the present invention compared to paper  
popcorn bags of conventional shapes under variations

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1 experienced in normal use. These variations include but  
are not limited to microwave ovens of differing wattage,  
volume, and/or efficiency, fluctuations in electric  
current, different magnetrons of the same or different  
5 manufacture, different wave guides, and the like.

If susceptor patch 30 is provided as in the preferred  
form, there is no need to include susceptor patch 30 at  
locations where unpopped kernels are not. Thus, susceptor  
patch 30 is located only at the bottom of the shaped wall  
1020 and can be of a minimized size due to the bowl or  
parabolic curve shape of wall 20. In this regard, and  
especially due to the bowl or parabolic curve shape of  
wall 20, susceptor patch 30 may be shaped to minimize  
material utilized such as being circular in shape or being  
15 in non-continuous areas. In the most preferred form,  
patch 30 is located within fold lines 32a, 32b, 36, and  
38.

Also, the round-like shapes of peripheries 20a and 22a  
of walls 20 and 22 and thus of bag 18 distribute the  
20 popped kernels into a wider distribution field. Being  
spread in the microwave oven cavity, the popped kernels  
become less attractive and are fairly transparent to the  
microwave energy. In addition to the less dense load  
configuration, the popped kernels are able to dissipate  
25 the heat better and therefore not allowing the popped  
kernels to continue to overcook, carmelize, burn, char, or  
dry out any further. This results in bag 18 that is less  
prone to scorching the popped product.

Further, the round-like shapes of peripheries 20a and  
30 22a of walls 20 and 22 and thus of bag 18 work very well  
in all microwave ovens equipped with or without  
turntables. No matter where the consumer places bag 18 in  
the microwave oven, bag 18 will always inflate and  
position itself near the center of the microwave oven.  
35 The round-like profile does not allow bag 18 to get hung  
up in the corners of the microwave ovens where typically  
cooler spots exist. The round-like shape always continues

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1 to rotate on the turntable ovens. This centered and/or  
rotating positioning of bag 18 allows bag 18 to move so  
that it is less likely for any particular point in bag 18  
to see specific hot spots or electronic nulls and allows  
5 the opportunity for the most consistent and uniform  
distribution of microwave cooking.

It should be noted that fin seal 28 of the most  
preferred form partially releases to vent steam from bag  
18 during microwave cooking. Additionally, after removal  
10 from the microwave oven, the consumer can grasp portions  
22b and 22c on opposite sides of seal 28 and pull them  
apart to further release fin seal 28 and if desired the  
interconnection between peripheries 20a and 22a adjacent  
15 to fin seal 28 in a manner as shown in Figure 9 to allow  
access to the hollow interior of bag 18 and specifically  
to the popped popcorn located therein. It can then be  
appreciated that bag 18 having top wall 22 including the  
peelable closure clearly functions as a serving bowl.

In alternate forms of bag 18, the serving bowl  
20 function can be accomplished by fabricating top wall 22  
from multiple layers of material. In a preferred form as  
shown in Figures 10 and 11, top wall 22 is formed from  
first and second wall portions 22d and 22e which are  
interconnected by a seal 40. In the preferred form shown,  
25 portion 22d is generally annular in shape including outer  
periphery 22a and an inner periphery 22f defining an  
access opening which is circular in the most preferred  
form. The size of the access opening should be sufficient  
to extend a hand into the interior of bag and grasp popped  
30 popcorn therefrom. Portion 22e is generally circular in  
shape and includes an outer periphery 22g which is of a  
shape generally corresponding to periphery 22f but of a  
size slightly greater than periphery 22f. In the most  
preferred form, outer periphery 22g includes an extension  
35 42 beyond the otherwise circular shape, with extension 42  
being of a size located within outer periphery 22a of top  
wall 22 in the preferred form shown. Seal 40 is annular

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1 in shape having an inner diameter corresponding to inner  
periphery 22f of portion 22d and an outer diameter  
corresponding to outer periphery 22g of portion 22e.  
Extension 42 in the most preferred form is not adhered and  
5 specifically in the form shown is not adhered to portion  
22d or any other portions of top wall 22 or bag 18.  
Additionally, in the most preferred form, seal 40 includes  
a first, peelable closure portion 40a which has an arcuate  
extent generally equal to the circumferential extent of  
10 extension 42 and a second, interconnection portion 40b  
extending the remaining circumferential extent of seal 40.  
In particular, portion 40a fails during microwave cooking  
to provide venting and to allow ease of separation when  
desired to open bag 18 whereas portion 40b as well as  
15 adhesive strip 26 remain secured during microwave cooking.

Bag 18 of Figures 10 and 11 can be manufactured  
according to the preferred teachings of the present  
invention in the following manner. Specifically, portion  
22e is positioned to overlie portion 22d, and portions 22d  
20 and 22e are positioned to overlie wall 20. Interconnection  
portion 26a of strip 26 and seal 40 are suitably activated  
to interconnect portions 22d and 22e to form wall 22 and  
to interconnect walls 20 and 22. After activation of  
first, interconnection portion 26a and seal 40, bag 18  
25 according to the teachings of the present invention can be  
folded, filled, sealed, folded, and overwrapped in  
generally the manner as set forth in Figures 3-7.

Bag 18 of Figures 10 and 11 will expand to an  
opposing, double dome shape in a similar manner as bag 18  
30 of Figures 1, 8, and 9. Thus, the advantages of the bowl,  
hemisphere, or parabolic curve shape are also obtained by  
inflated bag 18 of Figures 10 and 11 according to the  
preferred teachings of the present invention.

It should be noted that portion 40a of seal 40  
35 partially releases during microwave cooking to vent steam  
from bag 18 during microwave cooking whereas adhesive  
strip 26 and portion 40b remain secured. After removal

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1 from the microwave oven, the consumer can grasp extension  
42 between the consumer's thumb and one or more fingers  
of one hand and pull upwardly and diametrically, with  
extension 42 being free of adhesive securement resulting  
5 in advantages in its ability to be grasped. If necessary,  
bag 18 can be held by the consumer's other hand such as by  
grasping the rim defined by adhesive strip 26 between  
walls 20 and 22 at the circumferential position  
corresponding to extension 42. Due to the peelable nature  
10 of portion 40a, initial movement of extension 42 will  
release any remaining securement of portion 40a so that  
the part of portion 22e overlying portion 22d and portion  
40a will separate from portion 22d without tearing.  
However, with continued movement of extension 42 and due  
15 to the greater securement of portion 40b in the most  
preferred form, portion 22d will tend to tear following  
the outer periphery of seal 40 in a manner as best seen in  
Figure 11 rather than having portion 22e separate from  
portion 22d. In the most preferred form, portion 22e (and  
20 any parts of portion 22d corresponding to seal 40 and  
which are torn off) is completely removed from the  
remaining portions of bag 18. After removal of portion  
22e, portion 22d acts like an annular rim in holding the  
remaining portions of bag 18 in a serving bowl function.  
25 It should be appreciated that although the serving  
bowl function is accomplished by the peelable closure  
formed by fin seal 28 and by the multipaper fabrication  
provided by portions 22d and 22e in most preferred forms,  
the serving bowl function can be formed by other manners  
30 including by using perforations, tear strips, cut scoring,  
thinning sealant, and controlled delamination according to  
the teachings of the present invention. Likewise,  
although providing the peelable closure in top wall 22 is  
believed to be advantageous at least because of the  
35 serving bowl function, the peelable closure which fails  
during microwave cooking to provide venting can be formed  
at other locations such as in portion 26b. In particular,

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- 1        after popping the popcorn and while pinching bottom and  
top walls 20 and 22 between the fingers in the consumer's  
hands, bottom and top walls 20 and 22 can be pulled apart  
to separate any remaining securement of portion 26b and to  
5        separate portion 26a in an amount as desired such as to a  
circumferential extent allowing the popped popcorn to be  
poured therefrom or completely removing top wall 22 from  
bottom wall 20 so that bottom wall 20 performs a serving  
bowl function.
- 10        Although walls 20 and 22 are interconnected directly  
together adjacent to peripheries 20a and 22a in the most  
preferred form shown in Figures 1-3 and 8-12, walls 20 and  
22 according to the teachings of the present invention  
could be interconnected together by their interconnection  
15        to a side wall which accordions during the expansion of  
bag 18 to increase the size of the hollow interior of bag  
18 in its expanded condition. In an alternate embodiment  
according to the teachings of the present invention, walls  
20 and 22 of bag 18 could be interconnected together by  
20        their interconnection to gussetted side panels 50 and 52  
added on opposite sides of walls 20 and 22 such as in a  
manner shown in Figures 13-16. In the form shown,  
gussetted side panels 50 and 52 each comprises first and  
second side panel portions 50a and 50b and 52a and 52b  
25        joined along fold lines 50c and 52c, respectively. In the  
preferred form shown, fold lines 50c and 52c are linearly  
straight. Portions 50a, 50b, 52a, and 52b of panels 50  
and 52 include peripheries 50ad, 50bd, 52ad, and 52bd  
which are arcuate in shape corresponding to the  
30        peripheries 20a and 22a of walls 20 and 22. Peripheries  
50ad and 52ad are interconnected to periphery 20a and  
peripheries 50bd and 52bd are interconnected to periphery  
22a such as by adhesive strip 26, with fold lines 50c and  
52c being in a spaced, parallel relation.
- 35        In the preferred form shown, the maximum width of  
portions 50a, 50b, 52a, and 52b between peripheral edges  
50ad, 50bd, 52ad, and 52bd generally perpendicular to fold

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1    lines 50c and 52c is less than one half of the maximum  
2    diametric size of peripheries 20a and 20b generally  
3    perpendicular to fold lines 50c and 52c. In fact, as best  
4    seen in Figure 13, the widths of gussetted side panels 50  
5    and 52 are substantially less than the widths of the pleats  
6    of conventional popcorn package and specifically in a  
7    manner so as to minimize or eliminate extending over  
8    susceptor patch 30 and/or the charge of popcorn kernels to  
9    be popped. Thus, it is not necessary for the initial  
10   microwave energy to penetrate several layers of material  
11   before reaching the charge and therefore the microwave  
12   energy is generally available quicker and in greater  
13   amounts to the charge. However, portions 50a, 50b, 52a,  
14   and 52b can have widths of a size relative to the  
15   diametric size of walls 20 and 22 which is different than  
16   shown according to the teachings of the present invention.

17   Bag 18 of Figures 13-16 can be manufactured according  
18   to the preferred teachings of the present invention in the  
19   following manner. Specifically, side panels 50 and 52 are  
20   folded about fold lines 50c and 50d such that the outside  
21   surfaces of portions 50a and 52a overlie the outside  
22   surfaces of portions 50b and 52b. Walls 20 and 22 are  
23   positioned with their inside surfaces abutting together  
24   intermediate fold lines 50c and 52c, with the inside  
25   surface of wall 20 abutting with the inside surfaces of  
26   portions 50a and 52a and the inside surface of wall 22  
27   abutting with the inside surfaces of portions 50b and 52b  
28   and with peripheries 20a, 22a, 50ad, 50bd, 52ad, and 52bd  
29   aligned. First, interconnection portion 26a of strip 26  
30   is suitably activated to interconnect walls 20 and 22  
31   together intermediate fold lines 50c and 50d adjacent  
32   peripheries 20a and 22a aside from second, interconnection  
33   portion 26b, to interconnect wall 20 to portions 50a and  
34   52a adjacent peripheries 20a, 50ad and 52ad and to  
35   interconnect wall 22 to portions 50b and 52b adjacent  
36   peripheries 22a, 50bd and 52bd. After activation of  
37   first, interconnection portion 26a, bag 18 according to

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1 the teachings of the present invention can be folded,  
filled, sealed, folded, and overwrapped in generally the  
manner as set forth in Figures 3-7.

It should be appreciated that bag 18, including bag 18  
5 having gussetted side panels 50 and 52, can be  
manufactured in other manners according to the teachings  
of the present invention. As an example, a single  
rollstock of microwave bag material could be provided with  
susceptor patch 30 (if desired) and adhesive strip 26  
10 printed in the appropriate locations. The edges of the  
rollstock could be folded inward and lap or fin sealed to  
form a tube, and if desired, the gussets could be folded  
inward. The tube would then be heat-sealed and die-cut  
into the appropriate round-like shape. The preferred  
15 location of the lap or fin seal on the tube could be  
opposite to susceptor patch 30 when forming bag 18 of  
Figures 1-6, 8, and 9 as well as at other locations  
including along fold line 50c or 52c of gussetted side  
panel 50 or 52. Similarly, each component of bag 18 could  
20 be formed from separate rollstocks and cut to shape  
either before or after activation of adhesive strip 26.  
Likewise, although two panel portions 50a, 50b, 52a, and  
52b are provided in each of the gussetted side panels 50  
and 52 in the preferred form shown, it can be appreciated  
25 that gussetted side panels 50 and 52 can include  
additional panel portions having the same or differing  
widths.

In the preferred form shown in Figures 13-16, outer  
peripheries 20a and 22a of walls 20 and 22 have round-like  
30 shapes in the form of an oval. In the most preferred  
form, peripheries 20a and 22a of walls 20 and 22 and  
peripheries 50ad, 50bd, 52ad, and 52bd of side panels 50  
and 52 include peripheral extensions 54 which extend  
beyond the round-like shape of peripheries 20a and 22a and  
35 adhesive strip 26 adjacent the opposite ends of second,  
interconnection portion 26b.

Bag 18 shown in Figures 13-16 according to the

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1 preferred teachings of the present invention is similarly  
advantageous as previously set forth as well as  
advantageous for other reasons. Specifically, during the  
popping of the popcorn kernels and the expansion of bag  
5 18, gussetted side panels 50 and 52 will unfold along fold  
lines 50c and 52c so that panel portions 50a and 50b and  
panel portions 52a and 52b tend to approach a planar  
condition. However, even with the provision of gussetted  
side panels 50 and 52, walls 20 and 22 as the result of  
10 the expression of bag 18 expand into a bowl, hemispheric  
or parabolic curve shape from their peripheries 20a and  
22a. Thus, the advantages of the bowl, hemisphere, or  
parabolic curve shape of inflated bag 18 are obtained  
according to the preferred teachings of the present  
15 invention. In this regard, due to the oval shape of  
peripheries 20a and 22a in a flat condition and the  
expansion of gussetted side panels 50 and 52, bag 18 of  
Figures 13-16 tends to have a circular shape in an  
expanded condition when viewed from the top looking down.  
20 In the preferred form, the peelable closure is formed  
in the interconnection between walls 20 and 22 and  
intermediate gussetted side panels 50 and 52, and bag 18 is  
opened utilizing a cross pinch-pull technique similar to  
conventional rectangular microwave popcorn bags. In  
25 particular, portion 26b is formed as a peelable closure  
which fails during microwave cooking to provide venting and  
to allow ease of separation when desired to open bag 18.  
In particular, the corners defined generally at the  
interconnection of wall 20 and panel portion 50a (and in  
30 the most preferred form at the peripheral extensions 54  
thereof) is pinched between the thumb and forefinger of  
one of the consumer's hands and the corner defined  
generally at the interconnection of wall 22 and panel  
portion 52b (and in the most preferred form at peripheral  
35 extensions 54 thereof) is pinched between the thumb and  
forefinger of the other of the consumer's hands and the  
corners are pulled apart to release adhesive strip 26

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1 between wall 20 and panel portion 52a, between wall 22 and panel portion 50b and between walls 20 and 22. Then, bag 18 is grasped at the opposite corners defined generally at the interconnection of wall 20 and panel portion 52a and 5 at the interconnection of wall 22 and panel portion 50b (and in the most preferred form at peripheral extensions 54 thereof) and the corners pulled apart to release adhesive strip 26 between wall 20 and panel portion 50a, between wall 22 and panel portion 52b, and between walls 10 20 and 22. Adhesive strip 26 can be opened as little or as much as the consumer chooses ie a narrow opening facilitates pouring into a bowl whereas a wide opening facilitates easy eating directly out of bag 18. As consumers are accustomed to utilizing cross pinch-pull 15 techniques in opening conventional rectangular popcorn bags, increased consumer acceptance may be experienced with bag 18 of Figures 13-16 than with bags 18 which do not utilize cross pinch-pull techniques. Also, when the peelable closure is formed in the interconnection between 20 walls 20 and 22 as in Figures 13-16 as well as in Figure 12, top wall 22 can be formed from a single integral component according to the teachings of the present invention and specifically without the added expense of fabrication from multiple pieces required for fin seal 28 25 of Figures 1, 8 and 9, the layered portions 22d and 22e of Figures 10 and 11 or of fabrication with other manners of peelable closures.

Although openable along peripheries 20a and 22a, bag 18 of Figures 13-16 according to the teachings of the present 30 invention also provides a serving bowl function but in a different manner than bags 18 shown in Figures 1, 8, 9, 11 and 12. In particular, when inflated with popped popcorn, walls 20 and 22 intermediate fold lines 50c and 52c extend at a relatively large diameter arc generally 35 perpendicular to adhesive strip 26. Similarly, portions 50a and 50b and portions 52a and 52b which are unfolded relative to each other extend at a relatively large

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1 diameter arc generally parallel to adhesive strip 26  
intermediate fold lines 50c and 52c. Thus, a relatively  
flat support surface is defined thereby which can be  
placed on a table, counter, or the like to hold bag 18  
5 with walls 20 and 22 extending generally vertically and in  
a stable, non-tipping manner.

Additionally, in the preferred form, the serving bowl  
function of bag 18 of Figures 13-16 can be further  
enhanced by folding walls 20 and/or 22 and/or side panels  
10 50 and/or 52 about a fold line above the volume of popped  
popcorn so that the inside surfaces thereof abut in a  
manner as shown in Figure 15. In this regard, adhesive  
strip 26 between side panels 50 and 52 and walls 20 and 22  
can be separated by the consumer to an extent generally  
15 equal to the level of the popped popcorn. When so folded,  
the hand of the consumer would be less prone to rubbing  
against residual oil or grease on the inside surfaces of  
bag 18 while removing popcorn from bag 18 as the outer  
surface of side panels 50 and 52 and walls 20 and 22 would  
20 be what would be inadvertently touched. It should then be  
appreciated that the peripheral interconnection of walls  
20 and 22 and of walls 20 and 22 and side panels 50 and 52  
is especially advantageous in providing this enhanced  
serving bowl function without requiring tearing of bag 18.

25 Extensions 42 and 54 provide multiple functions  
according to the preferred teachings of the present  
invention. First, extensions 54 extend from the inflated  
bag 18 in a generally radial fashion, with both extensions  
42 and 54 creating a visual indication where bag 18 should  
30 be opened as extensions 42 and 54 have the appearance as  
handle tabs. Second, extensions 42 and 54 provide  
increased area for grasping and gripping by the consumer.  
Also, as extensions 54 are located outwardly of adhesive  
strip 26 and the interior of bag 18, extensions 54 do not  
35 have the tendency to be hot to the touch as other portions  
of bag 18 which have direct contact with the popped  
popcorn. Thus, extensions 54 provide increased consumer

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1 safety from contacting hot surfaces. Similar consumer  
safety is also provided by extension 42. It should be  
appreciated that due to the round-like shape of periphery  
22g of portion 22e of wall 22 and of peripheries 20a and  
5 22a of walls 20 and 22 and the arcuate shape of  
peripheries 50ad, 50bd, 52ad, and 52bd and since walls 20  
and 22 and side panels 50 and 52 are typically cut from  
continuous rollstock, extensions 42 and 54 according to  
the teachings of the present invention are formed from  
10 otherwise unused and discarded portions of the rollstock  
so that no additional cost is encountered in providing  
extensions 42 and 54.

Extensions 42 and 54 would have similar application to  
bags 18 according to the preferred teachings of the  
15 present invention which do not include gusseted side  
panels 50 and 52. As an example, where it is desired to  
provide a peelable closure between peripheries 20a and 22a  
of walls 20 and 22 such as to allow pouring of the popped  
popcorn therethrough, extensions 54 could be formed on  
20 peripheries 20a and 22a for separating adhesive strip 26  
therebetween. In such applications, extensions 54 could  
be formed as a continuous piece centered on the desired  
peelable closure. Likewise, extensions 56 could be formed  
on the edges of portions 22b and 26c at fin seal 28 such  
25 as shown in Figure 17 for grasping by the consumer in  
pulling the opposite sides of seal 28 when fin seal 28  
provides the peelable closure.

Additionally, although the particular manner of  
manufacture, filling, and folding of bag 18 is believed to  
30 be advantageous including but limited to having a final  
conventional, rectangular shape for secondary packaging  
purposes, bag 18 can be manufactured, filled and/or folded  
in other manners according to the teachings of the present  
invention. In this regard, it may be desirable to fold or  
35 otherwise configure bag 18 to have a final shape which is  
different than other conventional shapes to emphasize the  
uniqueness of bag 18 in the marketing thereof.

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CLAIMS

1. Expandable microwave package for holding a food product for popping or puffing in a microwave oven comprising, in combination: a bag including a bottom wall and a top wall, with the bottom and top walls each formed of a sheet of non-extendable flexible material, with the bottom wall having an outer periphery of a substantially round shape, with the top wall having an outer periphery of a substantially round shape corresponding to the outer periphery of the bottom wall, with the bottom and top walls being interconnected together adjacent to the outer peripheries, with the top and bottom walls expanding into an opposing double domed shape when the food product is popped or puffed in the microwave oven, with the interconnected outer peripheries puckering as the top and bottom walls expand into the opposing double domed shape.

2. The expandable microwave package of claim 1 wherein the bag further includes a first gussetted side panel and a second gussetted side panel, with the first and second gussetted side panels each being formed of a sheet of flexible material, with the gussetted side panels each being formed of at least first and second panel portions which overlie each other and which include outer peripheries corresponding to the outer peripheries of the bottom and top walls, with the bottom and top walls being interconnected together by their interconnection to the first and second gussetted side panels adjacent to the outer peripheries, with the bottom wall being interconnected to the first panel portions of the first and second gussetted side panels and with the top wall being interconnected to the second panel portions of the first and second gussetted side panels, with the top and bottom walls expanding into an opposing double domed shape as the food product is being popped or puffed in the microwave oven.

3. The expandable microwave package of claim 1 wherein the bottom and top walls are directly interconnected

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together adjacent to the outer peripheries.

4. The expandable microwave package of any proceeding claim wherein the bag further includes a peelable closure which fails during microwave cooking allowing trapped steam to vent and allowing the bag to be opened to provide access to the popped or puffed food product.

5. The expandable microwave package of claim 4 wherein the peelable closure is formed in the top wall.

6. The expandable microwave package of claim 5 wherein the top wall includes first and second wall portions and a seal between the first and second wall portions, with the seal between the first and second wall portions forming the peelable closure.

7. The expandable microwave package of claim 6 further comprising, in combination: first and second extensions formed on the bag, with the first and second extensions formed on the first and second wall portions and outward of the seal between the first and second wall portions.

8. The expandable microwave package of claim 6 or 7 wherein the seal extends between two points on the outer periphery of the top wall.

9. The expandable microwave package of claim 8 wherein the seal extends along a diameter of the shape of the outer periphery of the top wall.

10. The expandable microwave package of claim 4 further comprising, in combination: at least a first extension formed on the bag adjacent the peelable closure and outward of the peelable closure.

11. The expandable microwave package of claim 10 wherein the peelable closure is formed in the interconnection between the bottom and top walls.

12. The expandable microwave package of claim 11 further comprising, in combination: a second extension formed on the bag with the first and second extensions

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formed on the outer peripheries of the top and bottom walls and outward of the interconnection.

13. The expandable microwave package of claim 12 wherein the extensions are located on the outer peripheries on opposite sides of the peelable closure.

14. The expandable microwave package of claim 10 wherein the top wall has an access opening, with the bag further including a closure portion having an outer periphery of a size greater than the access opening, with the bag including a seal between the closure portion and the top wall around the access opening, with the extension formed on the outer periphery of the closure portion.

15. The expandable microwave package of claim 14 wherein the access opening and the outer periphery of the closure portion are generally circular in shape.

16. The expandable microwave package of claim 14 or 15 wherein the outer periphery of the top wall is of a size larger than the access opening; and wherein the extension is of a size located within the outer periphery of the top wall.

17. The expandable microwave package of claim 2 wherein the bag further includes a peelable closure which fails during microwave cooking allowing trapped steam to vent and allowing the bag to be opened to provide access to the popped or puffed food product; and wherein the peelable closure is formed intermediate the first and second gussetted side panels.

18. The expandable microwave package of claim 1 wherein the bottom and top walls are interconnected together adjacent to the outer peripheries by a first interconnection portion and a second interconnection portion, with the first interconnection portion extending a substantial portion of the outer peripheries, with the first interconnection portion interconnecting the outer peripheries prior to and after the introduction of the popcorn kernels into the bag,

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with the second interconnection portion allowing separation of the outer peripheries in the second interconnection portion for the introduction of the food product in the bag and interconnecting the outer peripheries in the second interconnection portion after the introduction of the food product into the bag.

19. The expandable microwave package of claim 18 wherein the first and second interconnection portions interconnect the outer peripheries in a sealing manner which does not vent during microwave cooking.

20. The expandable microwave package of claim 18 or 19 wherein the bag further includes first and second fold lines extending from first and second points on opposite sides of the second interconnection portion, with the first and second fold lines dividing the bag into a central portion and first and second wings, with the first and second wings overlaying the central portion.

21. The expandable microwave package of claim 20 wherein the first and second fold lines are in a spaced parallel relation.

22. The expandable microwave package of claim 21 wherein the radial distance between the first and second fold lines is generally equal to one half of a diameter of the shapes of the outer peripheries, with the first and second fold lines located on opposite sides of the diameter of the shapes of the outer peripheries and equidistant therefrom.

23. The expandable microwave package of claim 21 or 22 wherein the bag further includes a third fold line extending between the first and second fold lines when the first and second wings overlay the central portion, with the third fold line defining a third wing overlaying the first and second wings.

24. The expandable microwave package of claim 23 wherein the third fold line extends generally perpendicular

between the first and second fold lines, with the radial distance between the outer peripheries and the third fold line is generally equal to one third of the diameter of the shapes of the outer peripheries, with the second interconnection portion being opposite to the third wing.

25. The expandable microwave package of claim 23 or 24 wherein the bag includes a fourth fold line extending between the first and second fold lines when the first and second wings overlay the central portion, with the fourth fold line defining a fourth wing overlaying the third wing.

26. The expandable microwave package of claim 25 wherein the fourth fold line extends generally parallel to the third fold line, with the radial distance between the outer peripheries and the fourth line being generally equal to one third of the diameter of the shapes of the outer peripheries.

27. The expandable microwave package of any proceeding claim further comprising, in combination: a susceptor patch extending over the bottom wall.

28. The expandable microwave package of claim 25 or 26 further comprising, in combination: a susceptor patch extending over the bottom wall and generally between the first, second, third, and fourth fold lines.

29. The expandable microwave package of claim 4 wherein the peelable closure is a portion of the peripheral interconnection.

30. The expandable microwave package of claim 29 further comprising, in combination: at least one top extension formed on the outer periphery of the top wall; and at least one bottom extension formed on the outer periphery of the bottom wall, with the extensions formed adjacent the peelable closure and outward of the peripheral interconnection.

31. The expandable microwave package of claim 30 wherein first and second top extensions are formed on the

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outer periphery of the top wall spaced from each other and adjacent the opposite ends of the peelable closure; and wherein first and second bottom extensions are formed on the outer periphery of the bottom wall spaced from each other and adjacent the opposite ends of the peelable closure.

32. The expandable microwave package of any proceeding claim wherein the sheets of flexible material are paper.

33. The expandable microwave package of any proceeding claim wherein the package holds food product in the form of popcorn kernels.

34. The expandable microwave package of any proceeding claim wherein the domed shape of the bottom wall is of a parabolic curve shape to keep the unpopped or unpuffed food product huddled closer together.

35. The expandable microwave package of any claim 1-33 wherein the domed shape of the bottom wall is of a parabolic curve shape to enhance the ability of the bag to rock in any direction from the force of the popping or puffing food product hitting against the bag to maximize gravimetric separation of the unpopped or unpuffed food product to the bottom of the popped or puffed food product.

36. The expandable microwave package of any proceeding claim wherein the outer peripheries are circular in shape.

37. The expandable microwave package of any proceeding claim 1-35 wherein the outer peripheries of the top and bottom walls in a flat condition are oval in shape.

38. Expandable microwave package for holding a food product for popping or puffing in a microwave oven comprising, in combination: a bag having an interior for holding a charge of food product to be subjected to microwave energy and having a top wall including an access opening, with the bag further including a closure portion having an outer periphery of a size greater than the access opening, with the bag including a seal between the closure portion and the top wall around the access opening, with the

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bag expanding into an expanded condition.

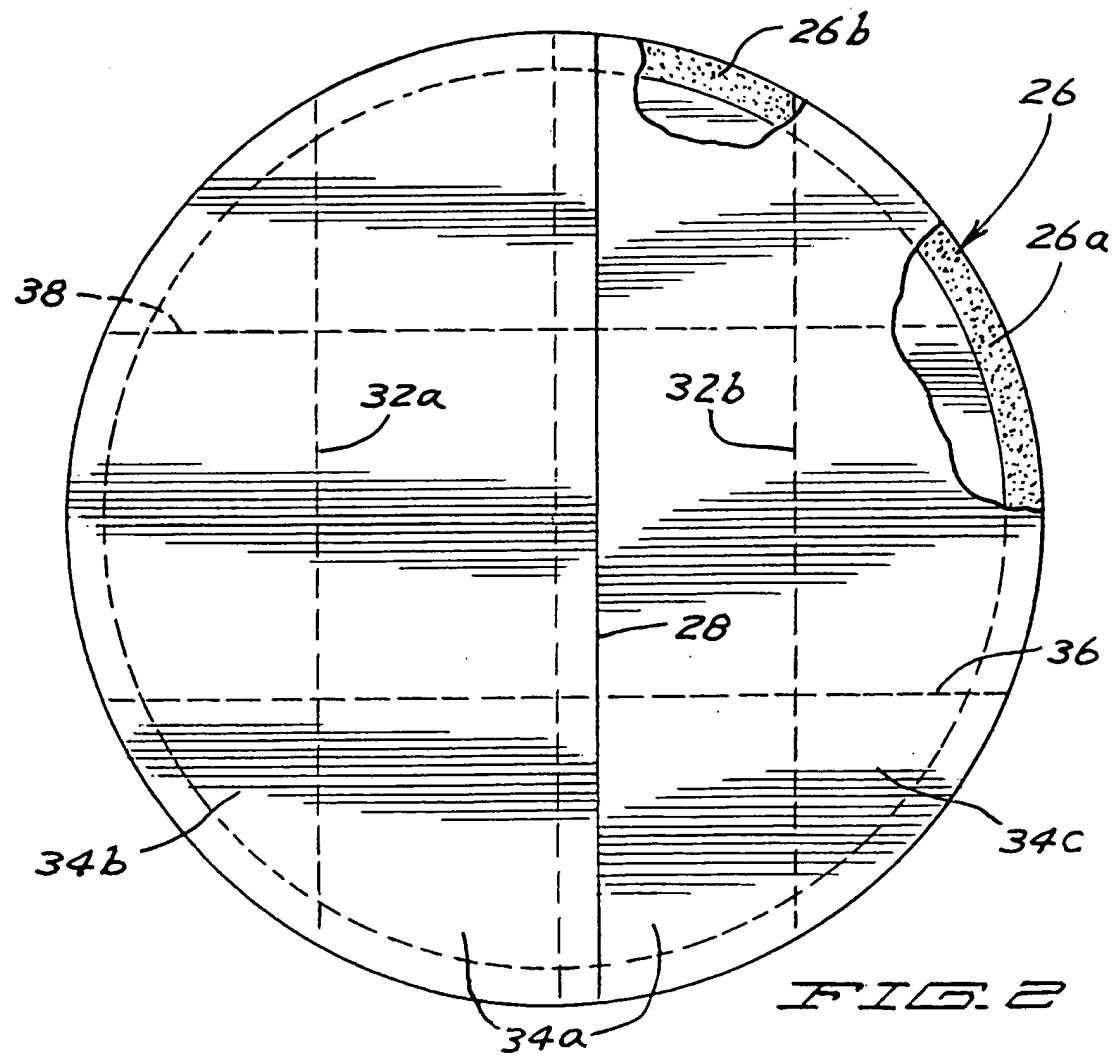
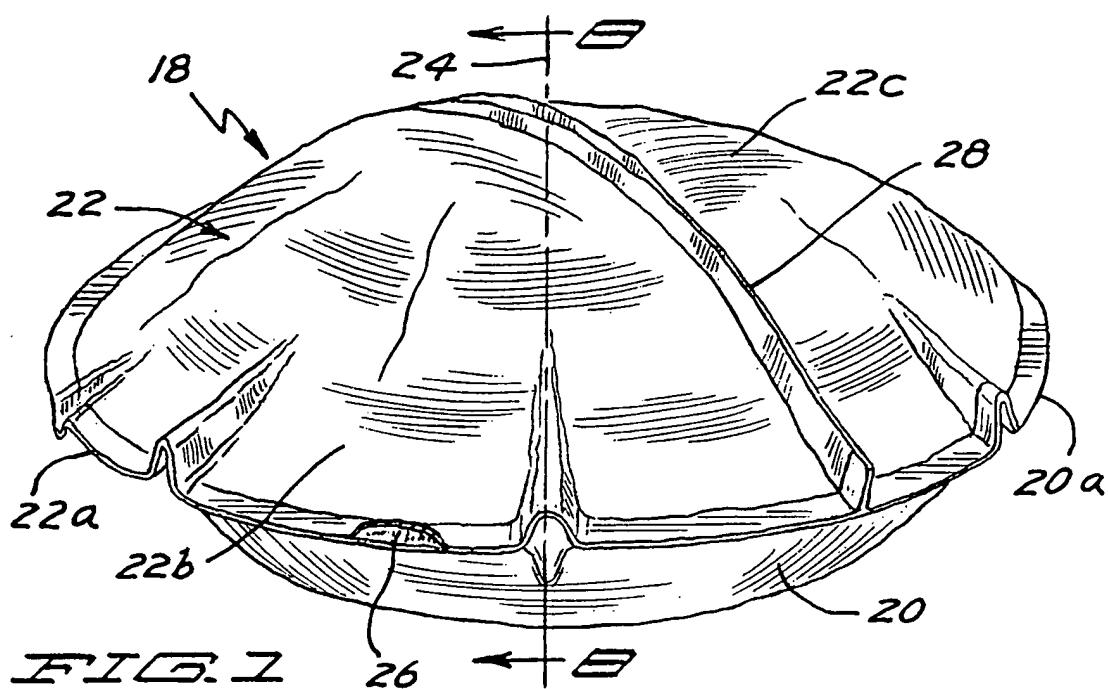
39. The expandable microwave package of claim 38 wherein the access opening and the outer periphery of the closure portion are generally circular in shape.

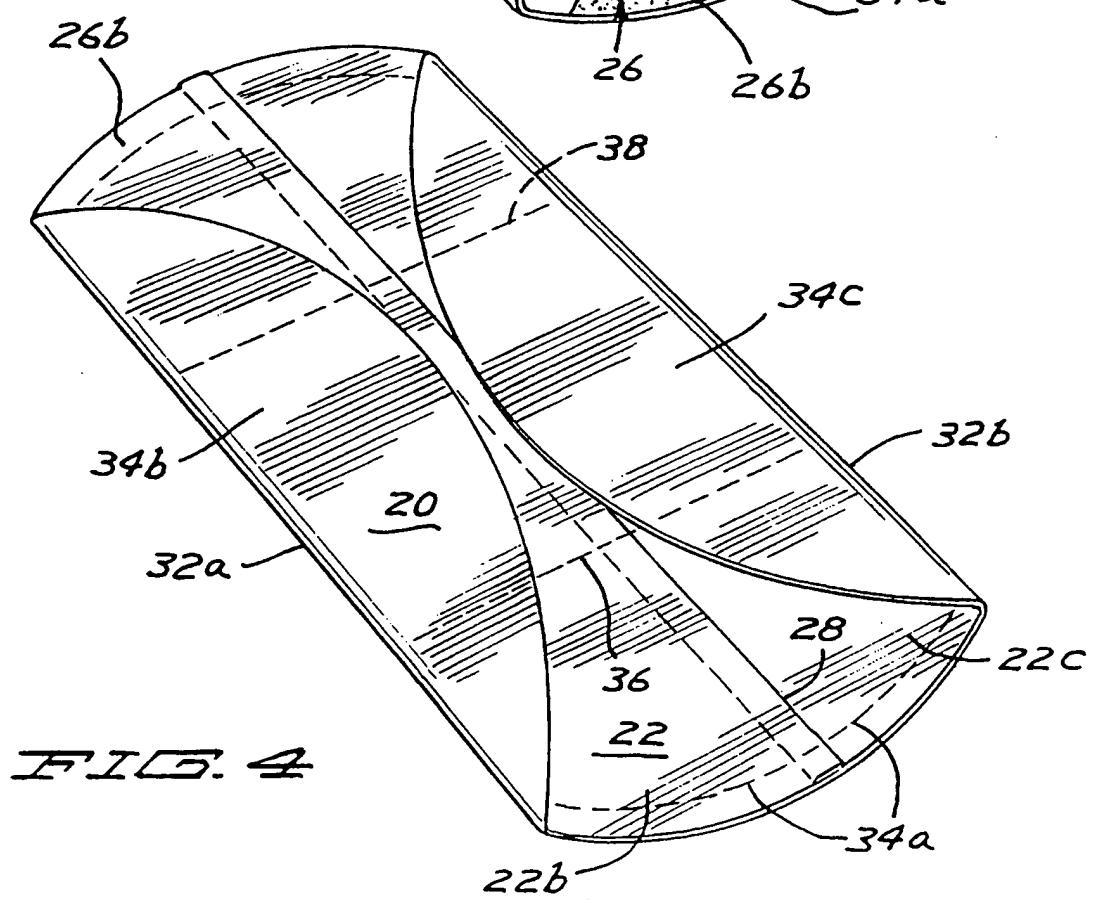
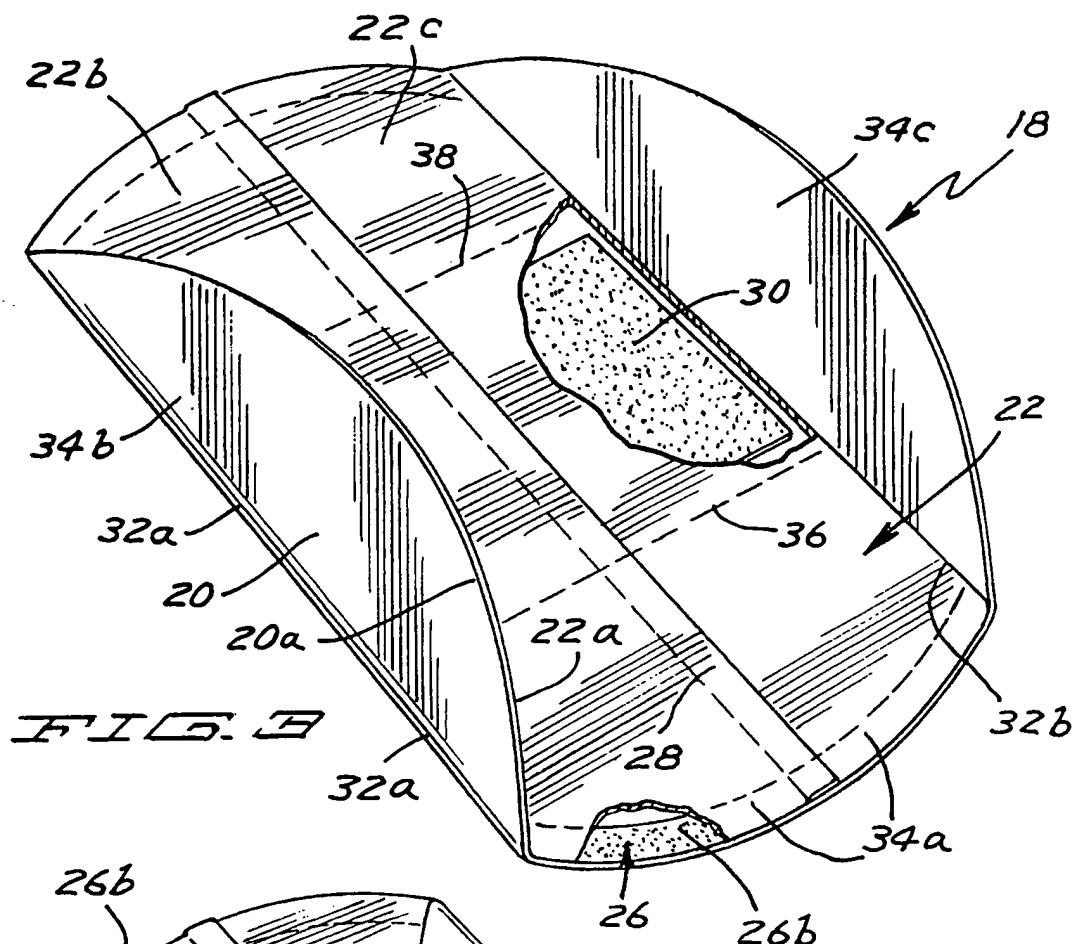
40. The expandable microwave package of claim 38 or 39 further comprising, in combination: an extension formed on the outer periphery of the closure portion outward of the seal.

41. The expandable microwave package of claim 40 wherein the top wall includes an outer periphery of a size larger than the access opening; and wherein the extension is of a size located within the outer periphery of the top wall.

42. The expandable microwave package of claim 41 wherein the outer periphery of the top wall has a substantially round shape.

43. The expandable microwave package of any claim 38-42 wherein the seal includes a peelable closure portion which fails during microwave cooking allowing trapped steam to vent and allowing the bag to be opened to provide access to the popped or puffed food product through the access opening.





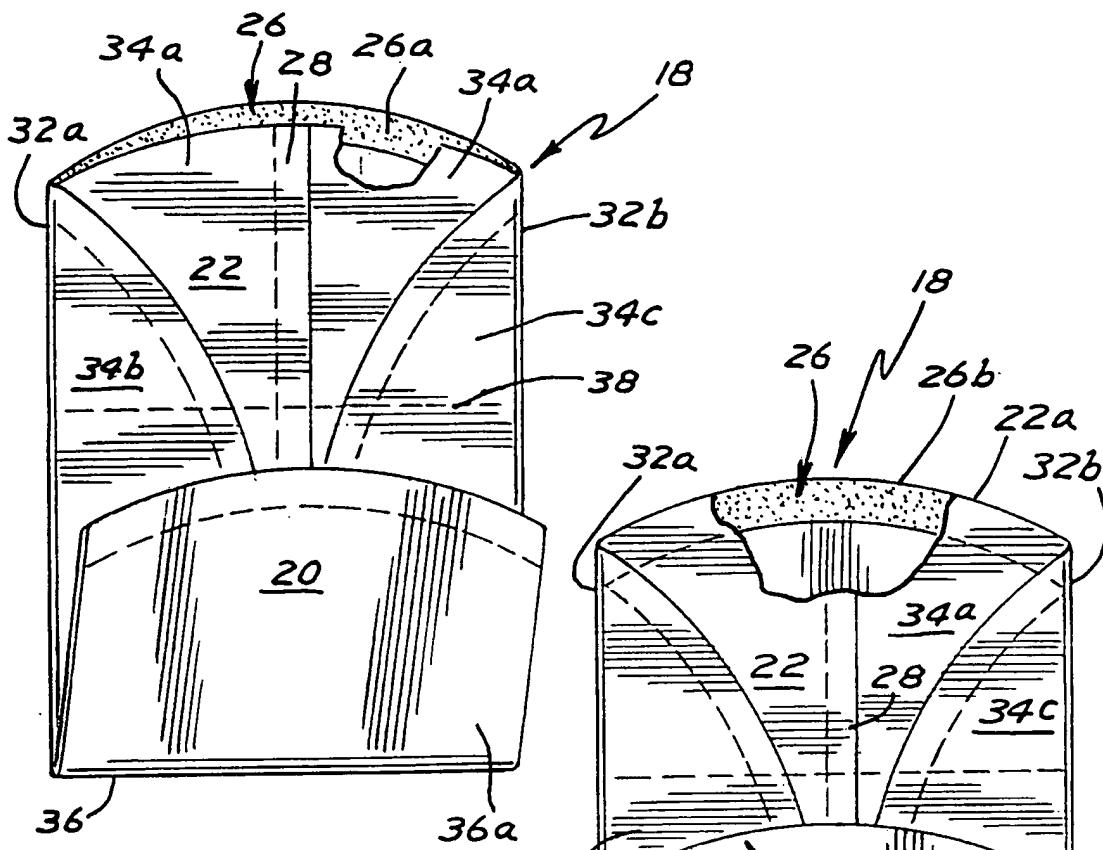


FIG. 5

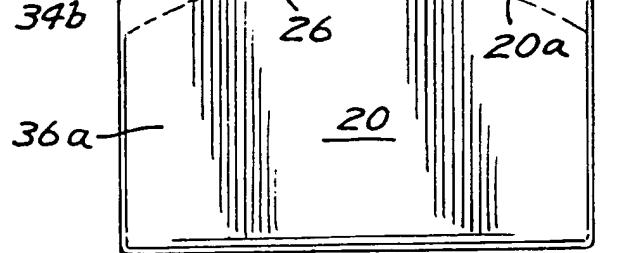


FIG. 6

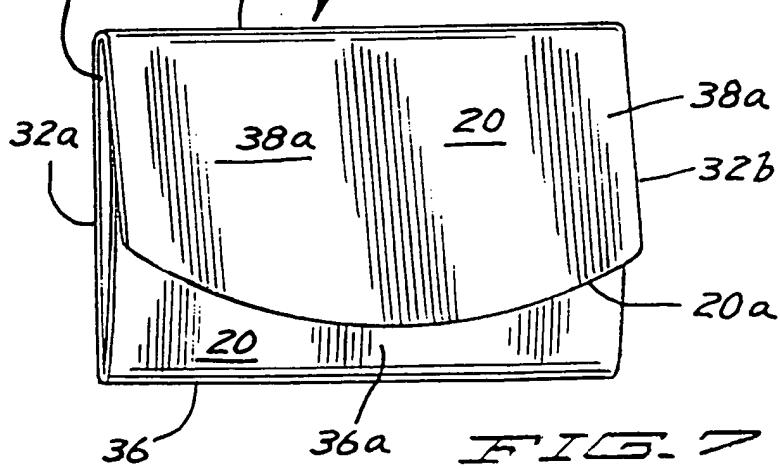


FIG. 7

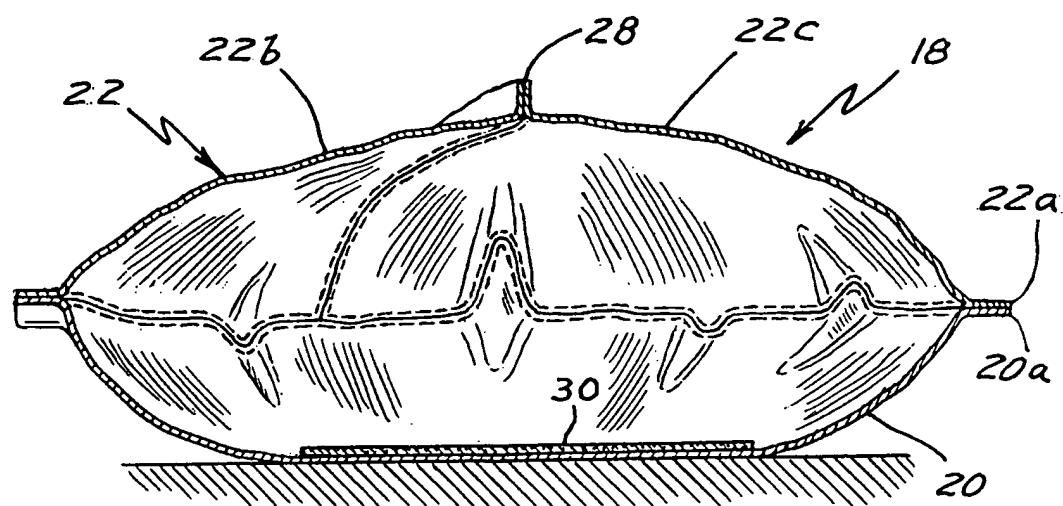


FIG. 8

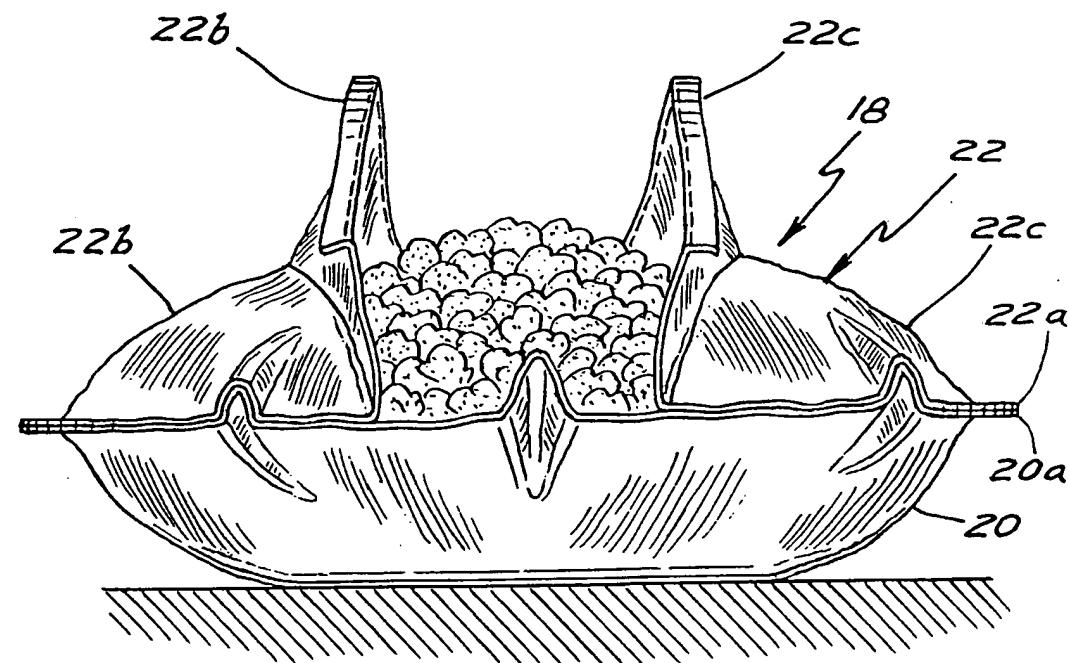
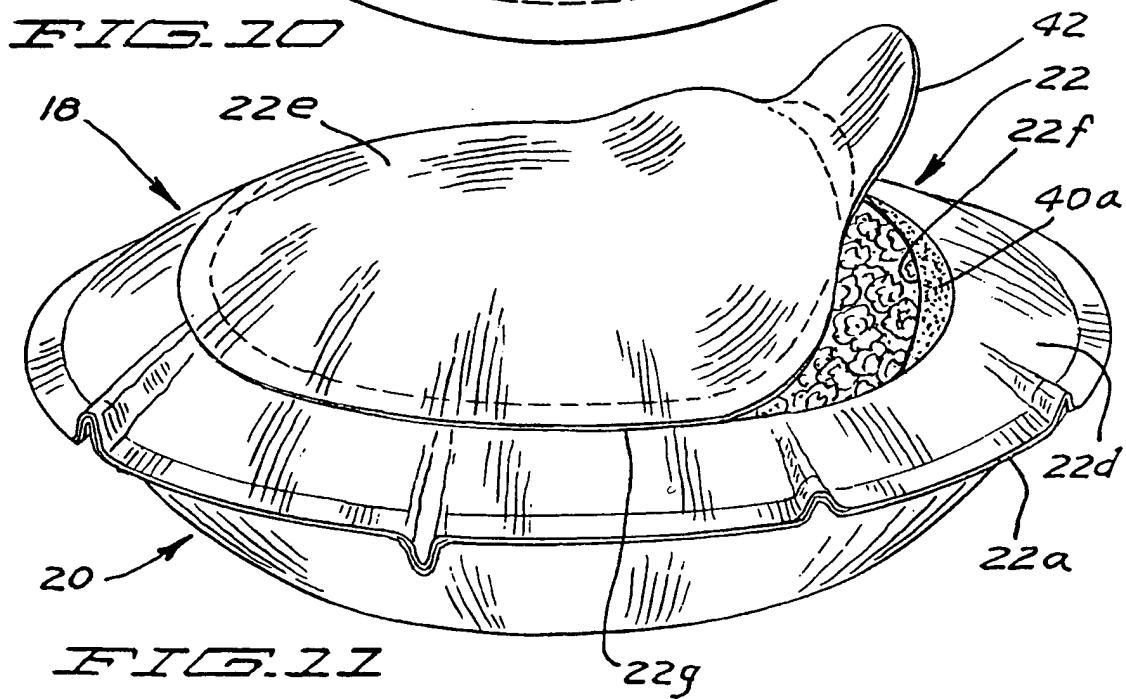
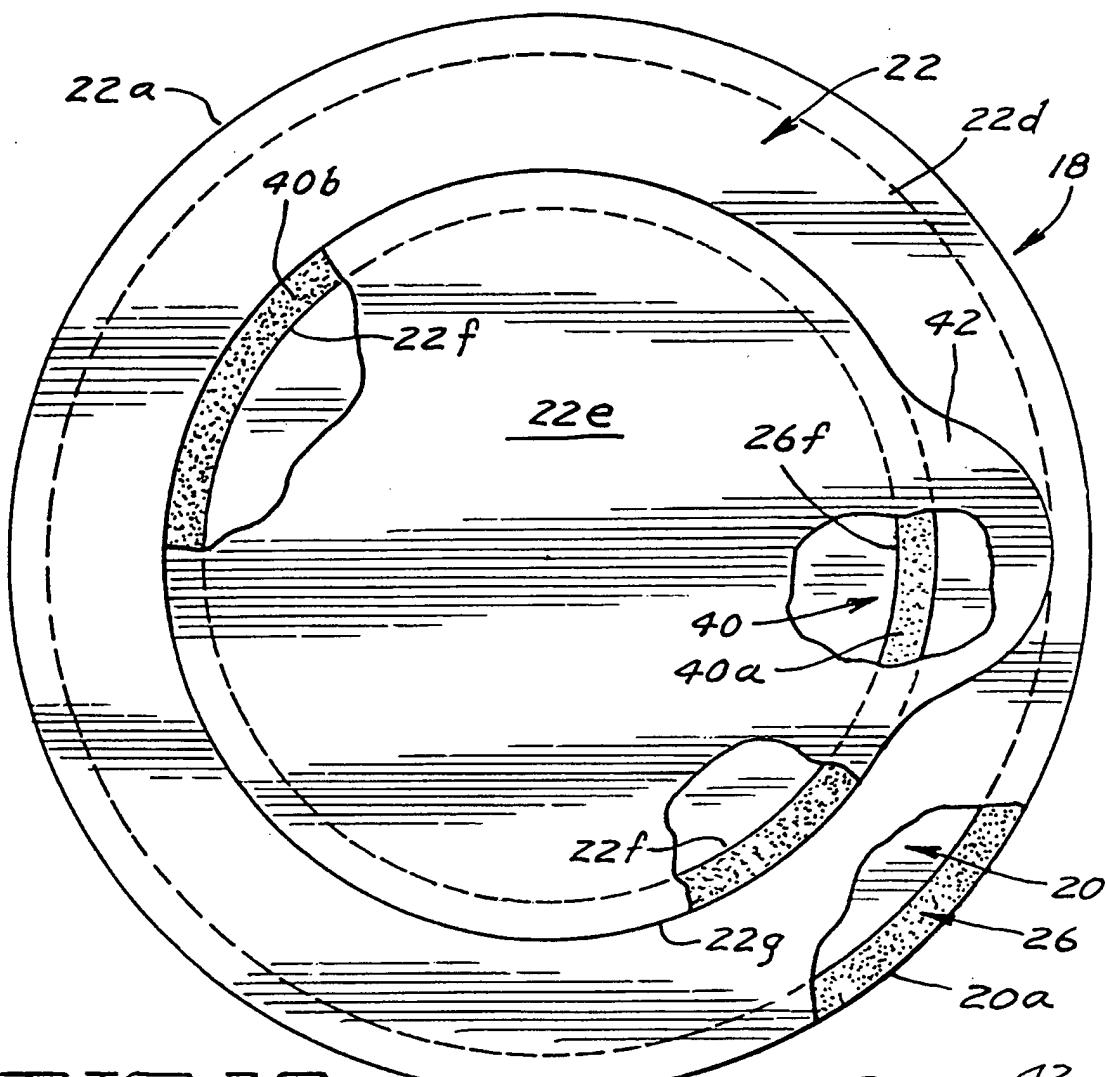


FIG. 9



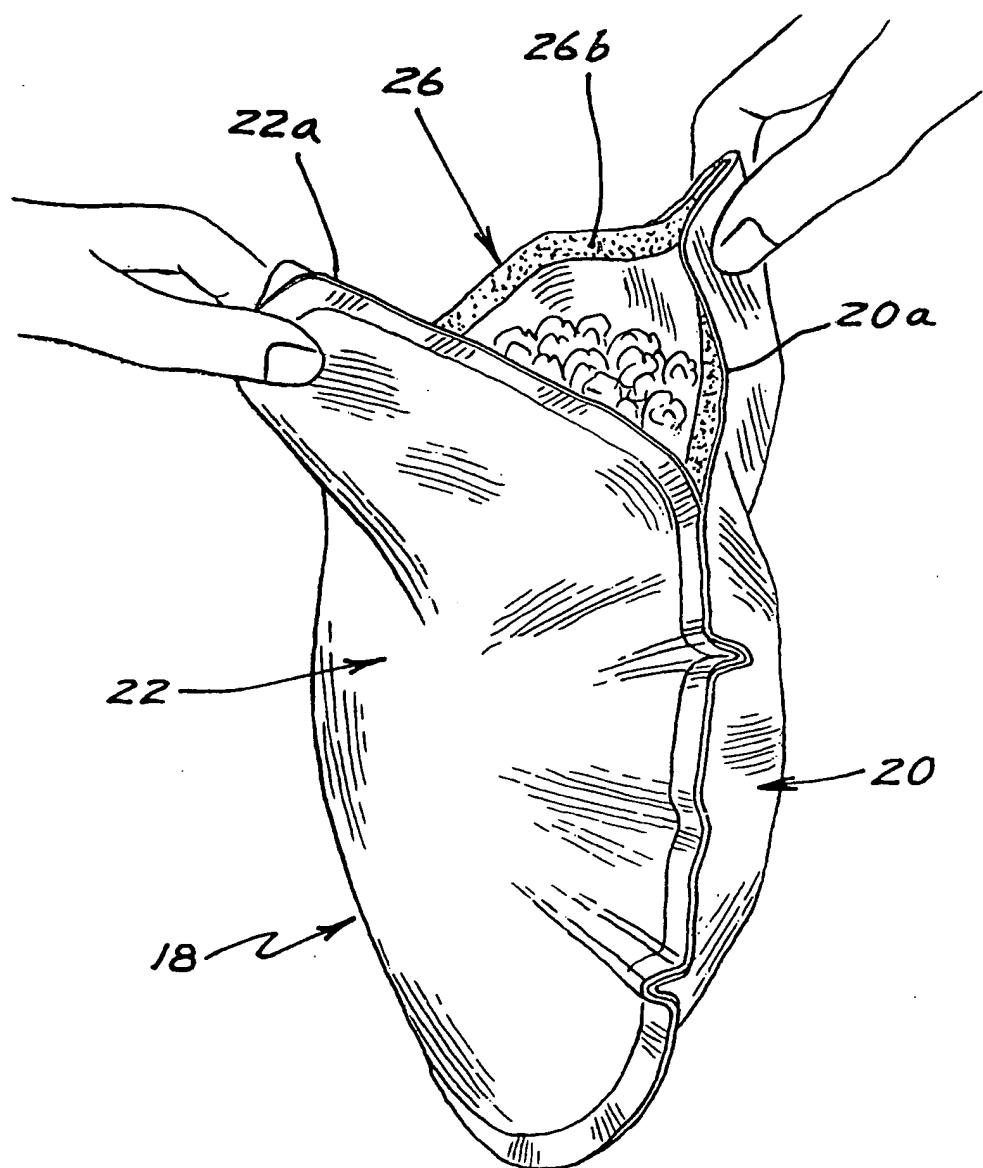
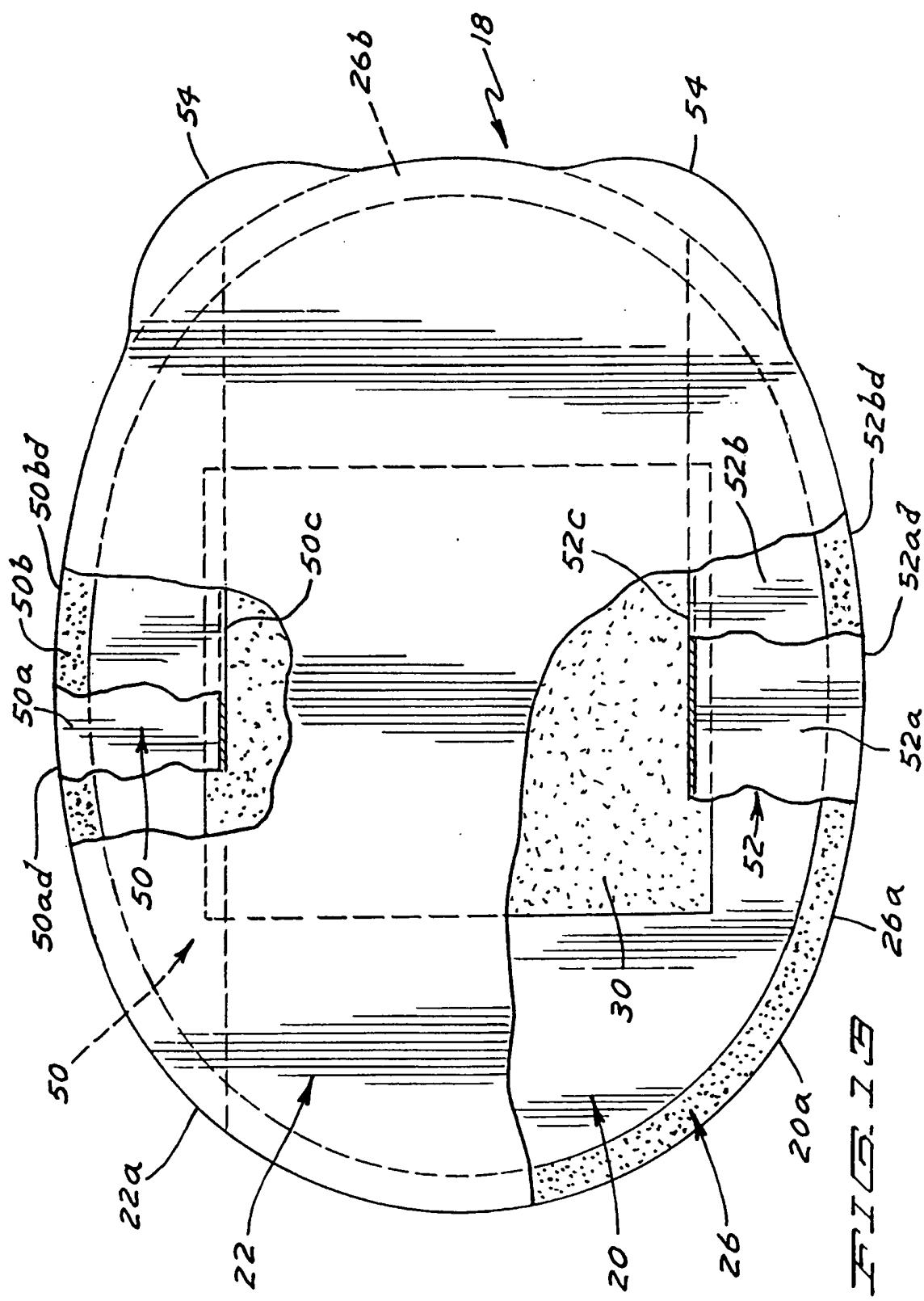
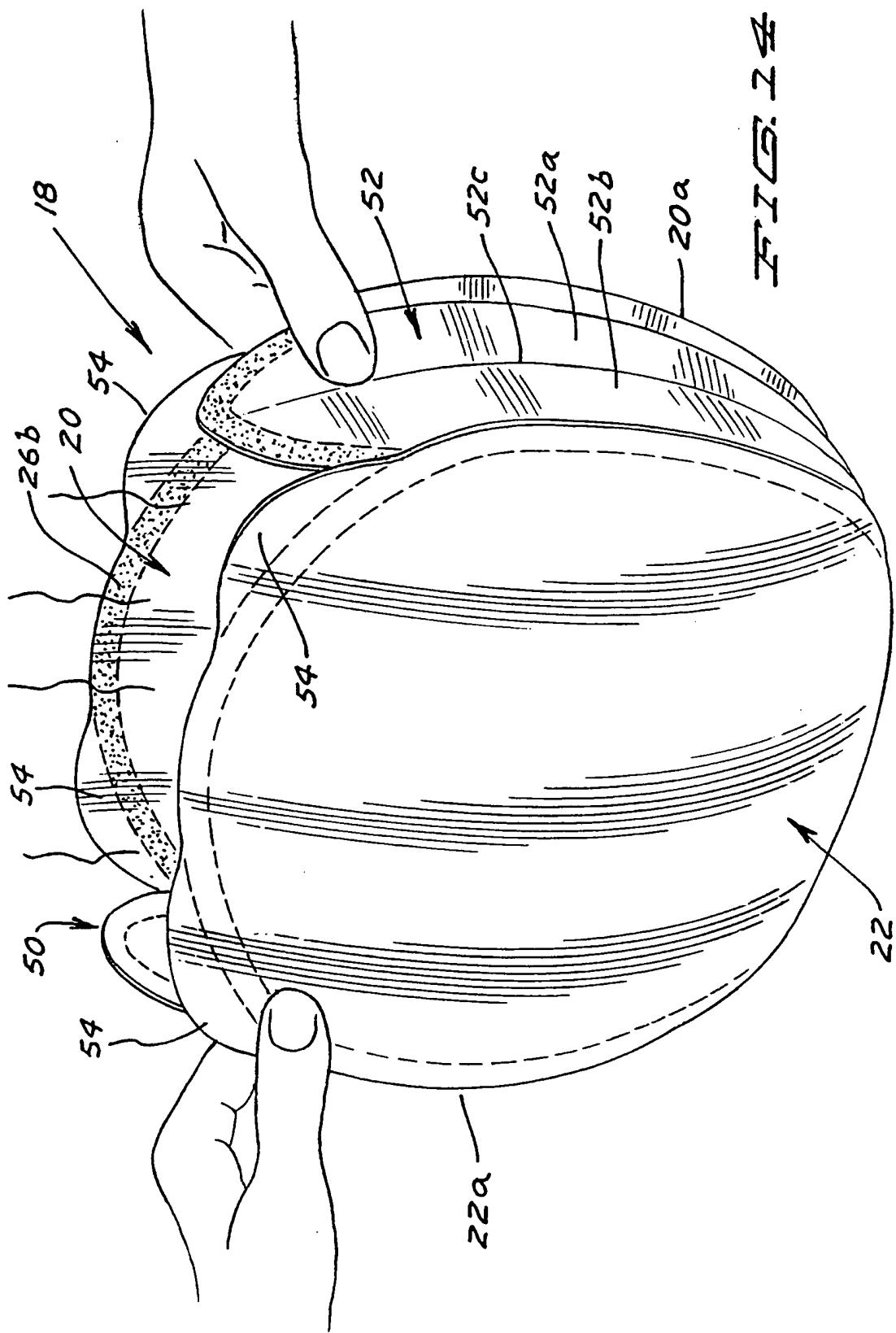
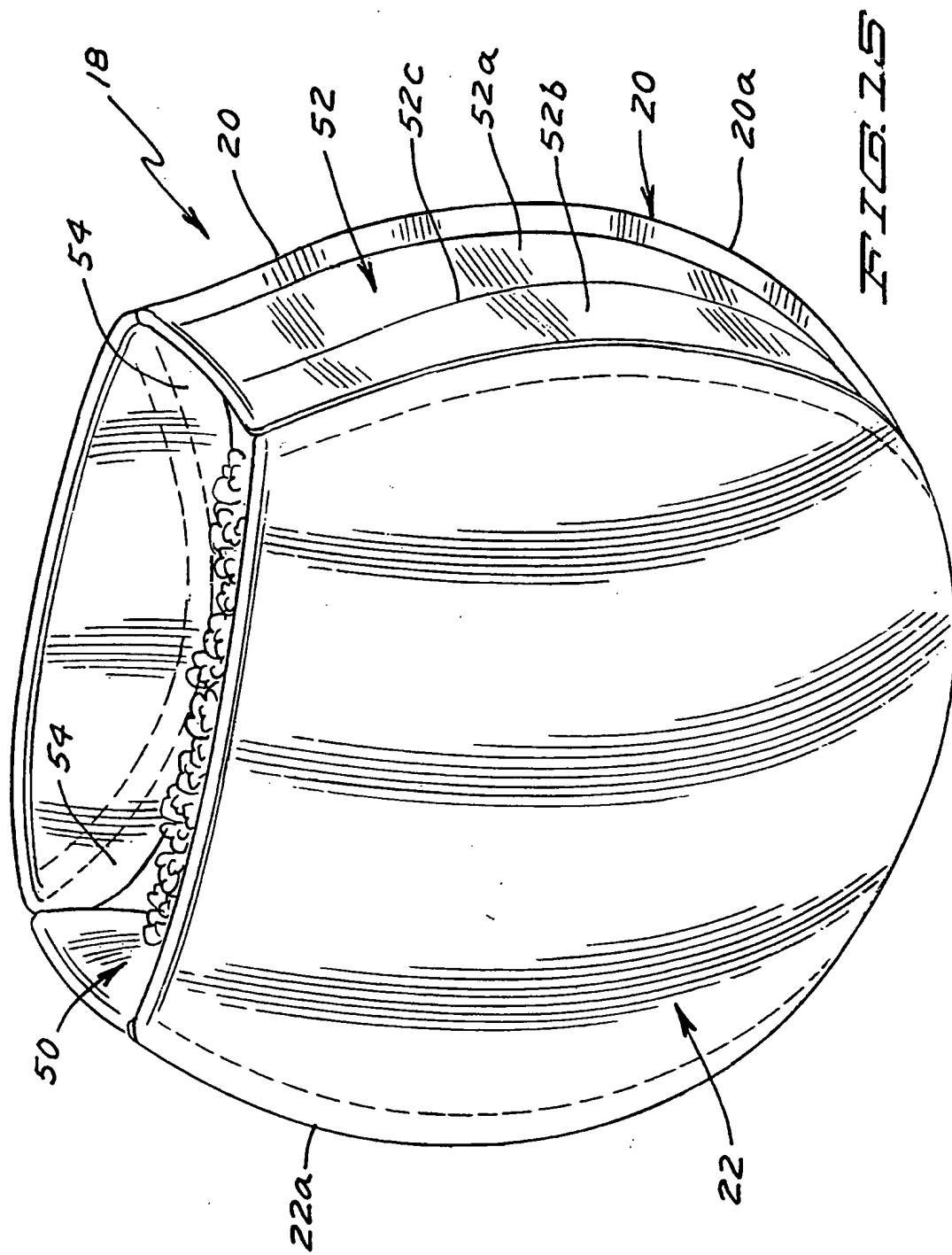


FIG. 10







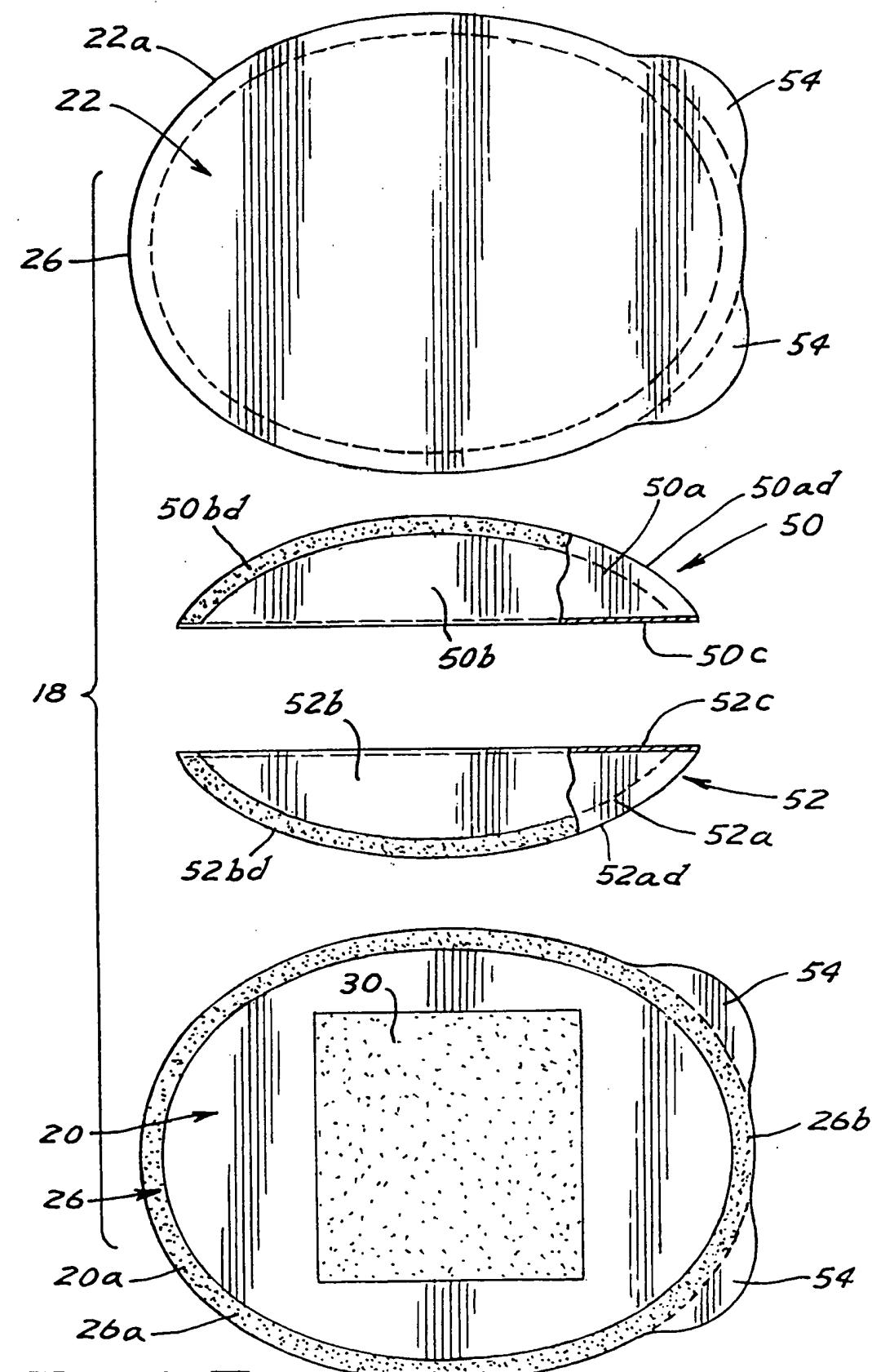


FIG. 25

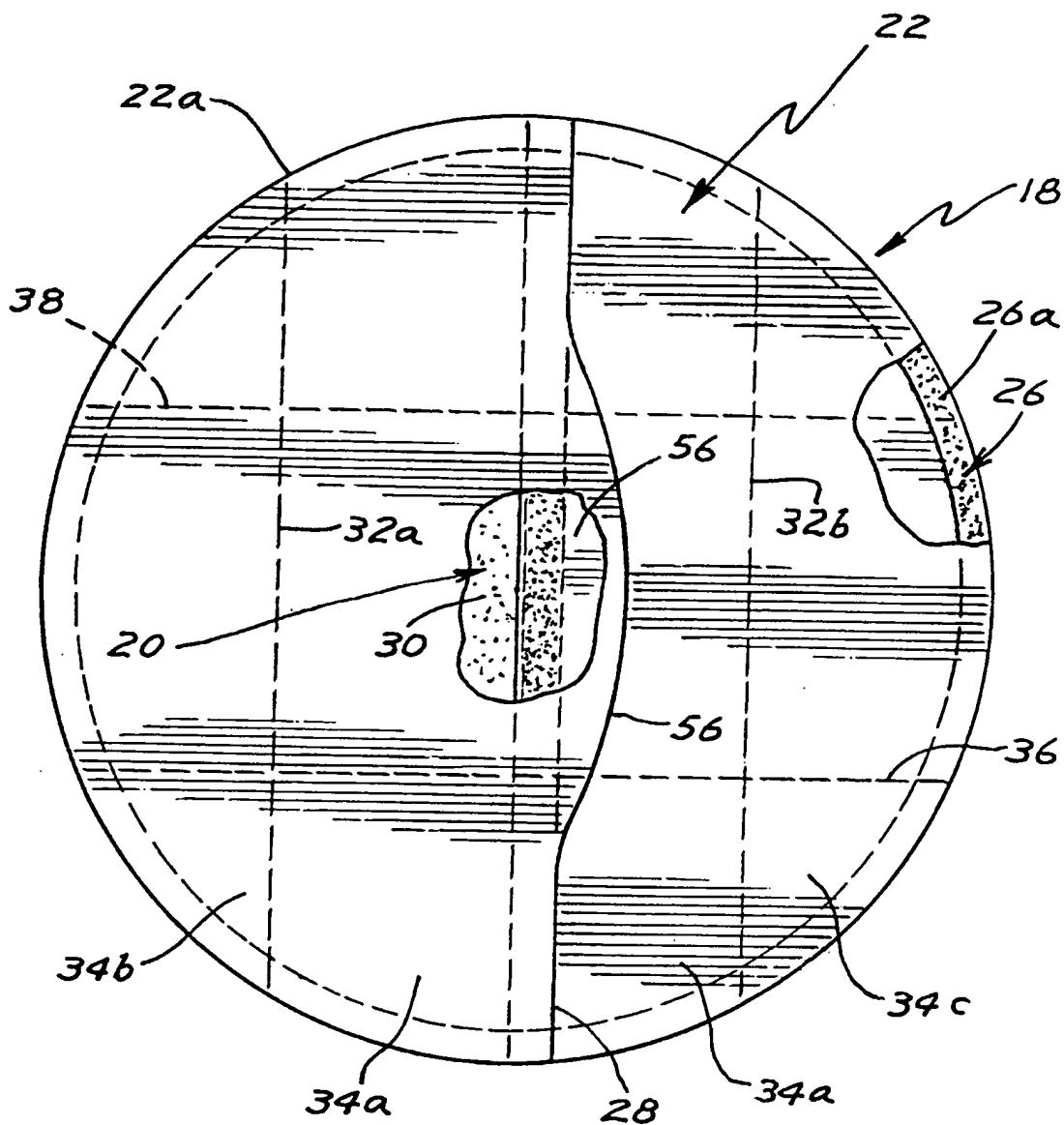


FIG. 27

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 98/21912

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 B65D81/34 B65D75/28

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 734 288 A (FINCHAM DOUGLAS M ET AL) 29 March 1988	1,3,4, 33-37
Y	see column 6, line 44 - column 8, line 14; figures 2,3	5,6,8,9, 18,27, 28,32
Y	EP 0 294 087 A (NABISCO BRANDS INC) 7 December 1988	5,6,8,9, 27,28,32
A	see page 8, line 38 - page 9, line 6; figures 10-12	2,20-26
Y	PATENT ABSTRACTS OF JAPAN vol. 16, no. 99 (M-1220), 11 March 1992 & JP 03 275474 A (YOSHIYUKI KIKAKU KK), 6 December 1991	18
X	see abstract	38,39
	---	-/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Date of the actual completion of the international search

3 March 1999

Date of mailing of the International search report

16/03/1999

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## INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 98/21912

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 5 473 142 A (MASS LAWRENCE) 5 December 1995 see the whole document ----	1-37
A	US 4 911 938 A (SIMON FREDERICK E ET AL) 27 March 1990 see the whole document ----	1-37
A	US 4 453 665 A (SCOTT RAYMOND G ET AL) 12 June 1984 see the whole document ----	1-37
A	GB 2 096 576 A (FOCKE & CO) 20 October 1982 see page 2, line 86 - line 105; figure 7 -----	1,2,17

**INTERNATIONAL SEARCH REPORT**

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